

Remarks/Arguments:

Claims 12-26 are pending in the application. Claims 12 and 22 are currently amended. The amendments are supported throughout the original specification. For example, the amendments to claims 12 and 22 are supported at pg. 11, lines 6-8 and pg. 13, lines 22-24. No new matter has been added.

Rejections under 35 U.S.C. § 112

Claims 12-26 stand rejected under 35 U.S.C. § 112, first paragraph, for failing to comply with the written description requirement and 35 U.S.C. § 112, second paragraph, as indefinite. The Office Action alleges that there is no support for the specific % content of graphitizable carbon, and graphitizable carbon was unclear. Applicants respectfully disagree as the limitation was supported in co-pending application 10/485,746 (which is incorporated by reference as EP 01 121 044 on pg. 8) at pg. 8, lines 16 and 17 and in the tables of the examples disclosing parts by weight. Applicants respectfully submit, however, that the rejection is now moot in view of the current claim amendments. Independent claims 12 and 22 recite, in part, "the graphitized carbon constituting the bonded network being present in an amount up to 15% by weight of the filter." These amendments are at least supported at pg. 13, lines 22-24 of the specification. No new matter has been added. Accordingly, Applicants respectfully submit that the Section 112 rejections should be withdrawn.

Rejections under 35 U.S.C. § 103

Claims 12-21 stand rejected as obvious over U.S. Patent No. 5,690,161 (Daussan) in view of U.S. Patent No. 5,785,851 (Morris) and U.S. Patent No. 5,520,823 (Jones). Claims 22-26 stand rejected as obvious over Jones et al. in view of Daussan and Morris. Claims 12-21 stand rejected as obvious over Daussan in view of Morris and U.S. Publication No. 2007/0090047 (Bell et al.). Claims 22-26 stand rejected as obvious over Bell in view of Daussan and Morris. Applicants respectfully traverse these rejections and submit that the currently pending claims are patentable over these cited references for at least the reasons set forth below.

"To establish a *prima facie* case of obviousness, ... the prior art reference (or references when combined) must teach or suggest all the claim limitations." M.P.E.P. §2143. Additionally, as set forth by the Supreme Court in *KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398 (2007), it is

necessary to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the prior art elements in the manner claimed.

Independent claim 12 recites, in part, "a carbon bonded network of graphitized carbon, the graphitized carbon constituting the bonded network being present in an amount up to 15% by weight of the filter."

Applicants offer the following comments in order to clarify some apparent confusion between graphitizable carbon bonding precursor, graphitizable carbon, and graphitized carbon. Without wishing to be limited to the theory, it is believed that graphitizable carbon bonding precursor is formed into an intermediate state, graphitizable carbon, which may then be converted into graphitized carbon. As explained in the specification, "the term 'graphitizable' means that the carbon bonding obtained by pyrolysis of the carbon precursor *can be* converted into a graphite like bonding *on heating to a higher temperature in the absence of air.*" Pg. 11, lines 6-8 of the specification (emphasis added). Thus, the graphitizable carbon bonding precursor is formed into a carbon bonded network (i.e., graphitizable carbon) by pyrolysis (e.g., 500-1000°C). Additionally, the carbon bonded network (i.e., graphitizable carbon) *can be* converted into graphitized carbon by heating at higher temperatures in the absence of air.

To transform graphitizable carbon bonding precursor into graphitized carbon, firing at a much higher temperature is necessary. Usually temperatures in a range of about 1800 to 2000°C must be used to transform the graphitizable carbon bonding precursor into graphitized carbon. The graphitizable carbon bonding precursor is completely transformed into a graphite structure only if sufficient high firing temperature and firing time is selected. By using a lower temperature of up to 1000°C (as claimed in Independent claims 12 and 22), an incomplete network of a graphite-like structure is formed which provides a firm adherence of the ceramic particles contained in the material of the filter device. During firing carbon-carbon bonds of the graphitizable carbon bonding precursor are broken and new bonds are formed. Thereby, a continuous carbon bonded network is formed which acts as a matrix into which ceramic particles are incorporated. Accordingly, the carbon bonded network may comprise graphitizable carbon and/or graphitized carbon.

Rejections of Claims 12-26 over Daussan, Morris, and Jones

Daussan, Morris, and Jones, alone or in any reasonable combination, do not teach each of the claimed limitations. Daussan describes a filter for molten metal comprising a protruding

frame joining a plurality of sieve plates, the protruding frame and sieve plates defining a reservoir chamber. As recognized in the Office Action, Daussan fails to disclose a bonded network of graphitized carbon (or graphitizable carbon) and does not teach that each plate includes a corrugated surface.

Jones is directed to a filter for filtering molten light metals formed from a composition comprising graphite, wollastonite, silicate, and borosilicate glass. The filters are manufactured (according to col. 2, lines 16-27 of Jones) by impregnating a large piece of reticulated organic foam with an aqueous slurry containing the graphite, wollastonite, silica, borosilicate glass, and one or more binders, which function during manufacturing, and optionally other components. The filter is characterized in that it consists of a crystalline phase comprising graphite and wollastonite dispersed in a substantially amorphous matrix of borosilicate glass. See col. 2, lines 10-16 of Jones.

The composition used for manufacturing the filter according to Jones comprises graphite. It does not teach or suggest a graphitizable carbon bonding precursor. In particular, there is no mention of a graphitizable carbon bonding precursor such as high melting pitch. The disclosure of Jones, including the examples, discusses graphite, not graphitizable carbon bonding precursor, graphitizable carbon, or graphitized carbon.

A person having ordinary skill in the art would understand the difference between graphite and a graphitizable carbon bonding precursor. Graphite is a stable carbon modification and will be transformed into another carbon modification only under very extreme reaction conditions. Thus, the graphite disclosed in Jones is stable under the conditions described in Jones. For example, the impregnated organic foam is dried and fired with a maximum firing temperature of about 800°C. Therefore, the filter disclosed in Jones would not form a carbon bonded network of graphitized carbon. As discussed above, the filter disclosed in Jones instead forms a substantially amorphous matrix of borosilicate glass in which isolated particles of a crystalline phase comprising graphite and wollastonite are dispersed. See col. 2, lines 13-16 of Jones. Jones does not disclose the use of a semi-damp mixture comprising a graphitizable carbon bonding precursor, but instead uses graphite as a starting material which is inert and under the firing conditions will not form a carbon bonded network of graphitized carbon. Furthermore, a graphite powder contained in the mixture for manufacturing a filter device will not be transformed into a carbon bonded network under the conditions defined in amended claim 12. Thus, Jones does not remedy the deficiencies of Daussan.

Morris describes a reticulated ceramic filter having a corrugated inlet surface which comprises upper surfaces and lower surfaces to provide a substantial contact area for molten metal supplied to the inlet surface. The composition of the reticulated ceramic filter is not described in detail but according to col. 2, lines 49-54, the reticulated ceramic portions of the filters may be made from zirconium partially stabilized with MgO or 92% Al₂O₃ ceramic material. Thus, Morris fails to disclose a bonded network of graphitized carbon (or graphitizable carbon). Accordingly, Morris does not remedy the deficiencies of Daussan and Jones.

As Daussan, Morris, and Jones, alone or in any reasonable combination, do not teach or suggest all of the claim limitations and no reason is identified, which would have prompted a person of ordinary skill in the art to substitute a graphitizable material for the graphite, a *prima facie* case of obviousness has not been established. Claim 12 should be in condition for allowance. Claims 13-21 depend from claim 12, and therefore should each be allowed for at least the reasons set forth above.

Claim 22, while not identical to claim 12, recites features similar to claim 12. Thus, claim 22 is not obvious over Jones, Daussan, and Morris for at least the reasons discussed above for claim 12. In particular, Jones does not disclose the use of a semi-damp mixture comprising a graphitizable carbon bonding precursor, but instead uses graphite as a starting material which is inert and under the firing conditions will not form a carbon bonded network of graphitized carbon. Claims 23-26 depend from claim 22, and therefore should each be allowed for at least the reasons set forth above.

Rejections of Claims 12-26 over Daussan, Morris, and Bell

Daussan, Morris, and Bell, alone or in any reasonable combination, do not teach each of the claimed limitations and/or a *prima facie* case of obviousness has been rebutted because Bell teaches away from the claimed invention and new and unexpected results were found. Daussan and Morris have been discussed in detail above and apply equally here. In particular, Daussan and Morris fail to disclose a graphitizable carbon bonding precursor which will form a carbon bonded network of graphitized carbon upon firing.

With respect to Bell, it is a continuation of Application No. 10/362,751 (issued as Patent No. 7,138,084), which claims priority to International Application PCT/GB01/03846 (the '846 PCT). Bell is not a 102(e) reference for the purpose relied on by the Office because the relevant

citation is not expressly supported by the '846 PCT reference. Thus, certain portions of Bell are not be entitled to be used as a 102(e) reference for an obviousness rejection.

Bell discloses a filter for molten metal formed by an open-pored porous material comprising particles of refractory material embedded in and bonded together by a carbon matrix bonding material. The porous article is preferably made by coating reticulated polyurethane foam with binder and refractory particles, and firing at preferably no higher than 800°C. While we recognize Bell broadly discloses a bonding material present at no more than 50%, Bell prefers that the relative proportions of particulate refractory material and bonding material is approximately 60 to 75% refractory : approximately 35 to 25% bonding material. Pg. 2, para. 0017 of Bell. See Example 1 showing 45 to 25% RAUXOLIT is used as the binding material. Thus, the preferred range in Bell of 35-25% teaches away from the lower claimed range of up to 15% graphitized carbon by weight of the filter. The specification of the pending application states "for optimal performance the graphitized carbon [content] should be present in an amount up to 15% by weight of the filter . . . even more preferred in an amount of at least 2% by weight up to 5% by weight." Pg. 13, lines 22-26 of the specification. Furthermore, a lower amount of graphitized carbon provided new and unexpected results. As explained above, by using a lower temperature of up to 1000°C (as claimed), an incomplete network of a graphite-like structure is formed. Thereby, a continuous carbon bonded network is formed which acts as a matrix into which ceramic particles are incorporated. Accordingly, the filter of claim 12 does not suffer from thermal shock or distortion. See Example, pg. 15. The filter also does not require the molten metal to be superheated and the molten steel flow is kept during filtration at a temperature slightly above liquidus. Thus, the filter obtained by claim 12 does not require superheated molten metal to avoid clogging of the filter and yet still provides sufficient stability (e.g., it does not suffer from thermal shock or distortion during contact with molten metal).

As Daussan, Morris, and Bell, alone or in any reasonable combination, do not teach or suggest all of the claim limitations, a *prima facie* case of obviousness has not been established. Even if a *prima facie* case of obviousness was established, it has been rebutted because Bell teaches away from the claimed invention and new and unexpected results were found. Accordingly, claim 12 should be in condition for allowance. Claims 13-21 depend from claim 12, and therefore should each be allowed for at least the reasons set forth above.

Claim 22, while not identical to claim 12, recites features similar to claim 12. Thus, claim 22 is not obvious over Daussan, Morris, and Bell for at least the reasons discussed above for claim 12. Claims 23-26 depend from claim 22, and therefore should each be allowed for at least the reasons set forth above.

Conclusion

For all of the foregoing reasons, Applicants respectfully request reconsideration and allowance of the claims. Applicants invite the examiner to contact their undersigned representative if it appears that this may expedite examination.

Respectfully submitted,



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